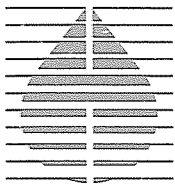


February 2, 1987

INFORMATION SUBMISSION
ON-SITE GROUNDWATER INVESTIGATION
PHASE 1 PART 2
MONTROSE SITE
TORRANCE, CALIFORNIA



HARGIS+ASSOCIATES, INC.
Consultants in Hydrogeology

Tucson/Phoenix/San Diego



INFORMATION SUBMISSION
ON-SITE GROUNDWATER INVESTIGATION
PHASE I PART 2
MONTROSE SITE
TORRANCE, CALIFORNIA

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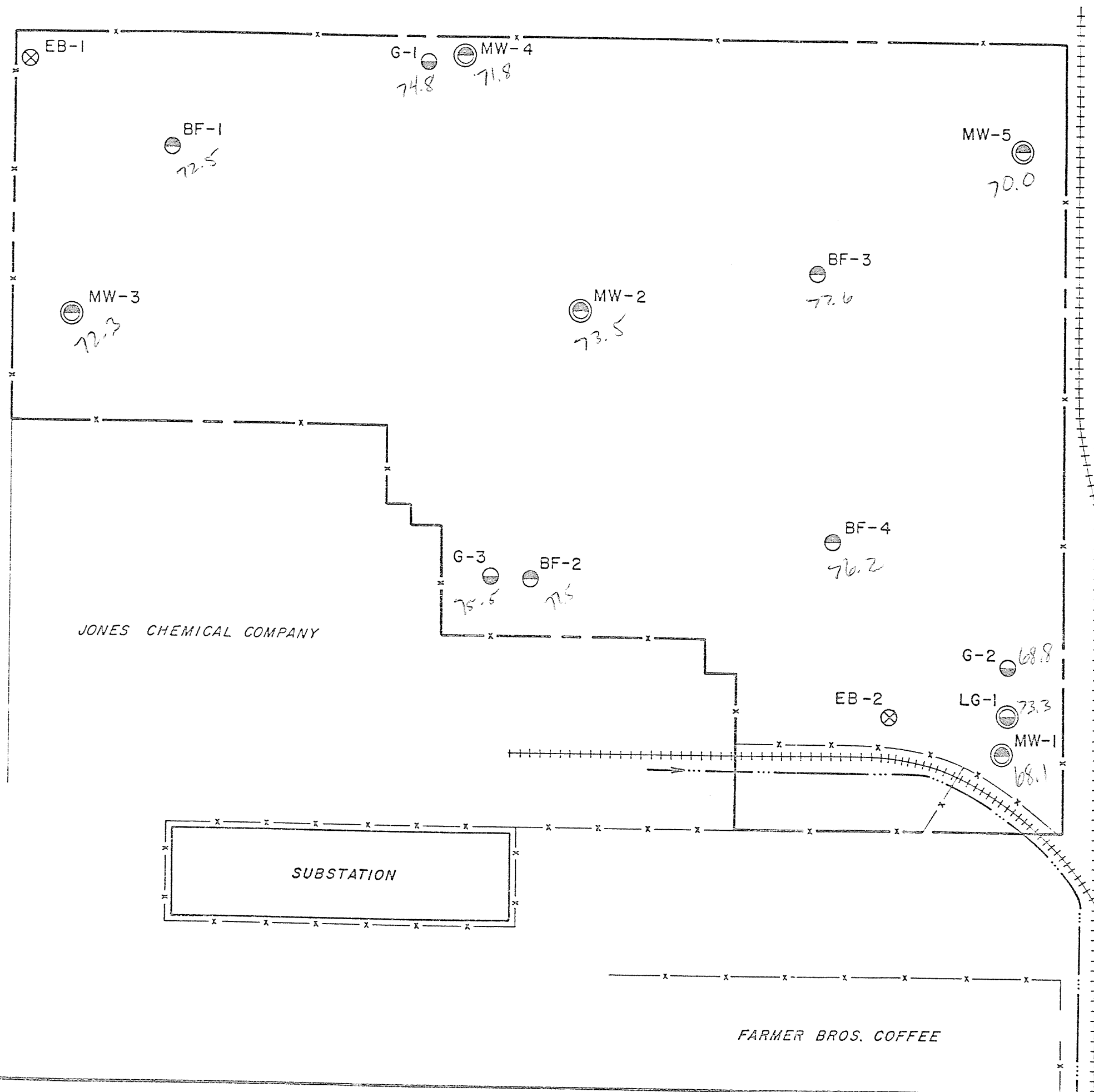
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**INFORMATION SUBMISSION
ON-SITE GROUNDWATER INVESTIGATION
PHASE I PART 2
MONTROSE SITE
TORRANCE, CALIFORNIA**

INTRODUCTION

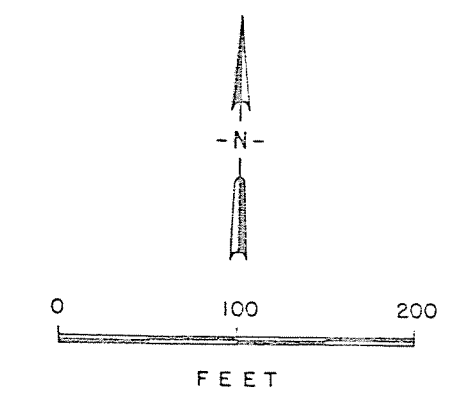
The following information, as required by the EPA Consent Order, consists of field data from the September 1986 through January 1987 on-site groundwater investigation of the Montrose site. Field work was conducted in accordance with the EPA-approved July 30, 1986 Sampling Plan and QAPP. This phase of work included two exploratory borings, eight groundwater monitor wells, and two rounds of groundwater sample collection. Field data from on-site soil sampling conducted in late September and early October, 1986 were submitted in a previous data package dated October 20, 1986.





EXPLANATION

- EB-1
⊗ EXPLORATION BOREHOLE
- MW-2
⊙ UPPER BELLFLOWER AQUITARD MONITOR WELL (CONSTRUCTED IN SPRING 1985)
- BF-3
● BELLFLOWER AQUITARD MONITOR WELL
- G-1
⊙ UPPER GAGE AQUIFER MONITOR WELL
- LG-1
⊙ LOWER GAGE AQUIFER MONITOR WELL
- ++++ RAILROAD TRACKS
- DRAINAGE DITCH
- x- FENCE (approximate)



MONTROSE CHEMICAL CORPORATION TORRANCE, CALIFORNIA	
LOCATION OF MONITOR WELLS PHASE I PART 2	
HARGIS + ASSOCIATES, INC. Consultants in Hydrogeology San Diego, California	FIGURE 1
PREPARED BY <u>AM</u>	REVIEWED BY <u>RM</u>

Appendix A



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APPENDIX A

LITHOLOGIC LOGS



APPENDIX A

LITHOLOGIC LOGS

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TABLE A-1
LITHOLOGIC LOG OF EXPLORATORY BORING EB-1

DEPTH INTERVAL (FEET BELOW LAND SURFACE)		GROUP SYMBOL*	DESCRIPTION OF MATERIAL
0-0.75	ASPHALT AND SUBGRADE		
0.75-19	SILT	ML	Yellowish brown, stiff, trace of fine sand, micaceous, slightly plastic.
19-23	SILT	ML	Light yellowish brown, stiff, moderately plastic.
23-24	SANDY SILT	ML	Light olive brown, firm, sand is fine-grained.
24-39	SAND	SP	Pale olive, medium dense, fine- grained.
39-42	SAND	SP	Pale yellow, dense, fine-grained, pearl white shell fragments.
42-45.75	SILTY SAND	SM	Light brownish gray, medium dense, fine-grained sand.
45.75-61	SAND	SP	Pale olive, dense, fine-grained, reddish brown shell fragments.
			At 48-50 feet, a few silty sand stringers.
			At 50 feet, shell fragments.
			At 52-61 feet, medium dense.

*Unified Soil Classification System
ASTM D-2487



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TABLE A-1
LITHOLOGIC LOG
OF EXPLORATORY BORING EB-1

DEPTH INTERVAL (FEET BELOW LAND SURFACE)		GROUP SYMBOL*	DESCRIPTION OF MATERIAL
61-81	SAND	SP	Olive to olive gray, very dense, fine-grained, grains are subangular to subrounded, predominantly quartz, some mica. At 61-68.25 feet, some shell fragments with a thin, platy, pearly luster. At 69.3 feet and 70.2 feet, thin beds of silty sand. At 80.25-81 feet, dense, trace mica.
81-83	SANDY SILT	ML	Light olive brown, firm to stiff.
83-84.75	SAND	SP	Pale olive, medium dense to dense, fine-grained, grains are subdiscoidal to subprismoidal, angular to subrounded.
84.75-86	SILTY SAND	SM	Olive gray, dense, sand is fine-grained, iron oxide stains, some mica.
86-88.5	SANDY SILT/ SILTY SAND	ML/SM	Pale olive, dense, fine-grained sand; nonplastic sandy silt.
88.5-90.5	SANDY SILT	ML	Pale olive, nonplastic; sand is fine-grained.
90.5-92.5	INTERBEDDED SILT AND SAND	ML/SP	Silt is pale olive, firm, some fine-grained sand, moderately plastic; sand is light yellowish brown, fine- to medium-grained, loose- to medium-dense, sand grains are subangular to subrounded, subdiscoidal to subprismoidal; distinctive multicolored grains including: black, white, clear, green, orange, yellow, red, and purple.

*Unified Soil Classification System
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TABLE A-1
LITHOLOGIC LOG
OF EXPLORATORY BORING EB-1

DEPTH INTERVAL (FEET BELOW LAND SURFACE)		GROUP SYMBOL*	DESCRIPTION OF MATERIAL
92.5-101	SAND	SP	Light yellowish brown to brownish yellow, loose to medium dense, fine- to medium-grained, grains are subdiscoidal to subprismatic, subangular to rounded, multicolored grains as described from 90.5-92.5.
101-102	SILT	ML	Very dark gray to brown, firm, moderately plastic, some tan calcareous cementation; some sand, fine- to medium-grained.
102-124	SAND	SP	Light olive brown to light yellowish brown, medium dense to dense, fine- to medium-grained, grains are subrounded to rounded, subdiscoidal to subprismatic, some iron oxide staining, distinctive multicolored grains including: black, white, clear, green, orange, yellow, red and purple.
124-128	SILTY SAND	SM	Pale yellow, dense, fine- to medium-grained sand, well sorted, sand grains are subdiscoidal to spheroidal, subrounded to rounded, slightly plastic, some distinctive multicolored grains including: orange, red, white and black, predominantly quartz.
128-137.5	SAND	SP	Light olive gray, very dense, medium- to fine-grained, well graded, grains are subdiscoidal to subprismatic, subangular to rounded, some distinctive multicolored grains including: black, white, green, red, orange, tan, amber; predominantly quartz, moderately strong sweet odor.

*Unified Soil Classification System
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TABLE A-1
LITHOLOGIC LOG
OF EXPLORATORY BORING EB-1

DEPTH INTERVAL (FEET BELOW LAND SURFACE)		GROUP SYMBOL*	DESCRIPTION OF MATERIAL
137.5-139	CLAY/SHALE	CL	Clay is gray, very stiff, highly plastic, grading to shale; grayish olive green, hard, horizontal laminations.
139-144	SILTY SAND	SM	Medium bluish gray, very dense, medium- to fine-grained, well sorted, sand grains are subdiscoidal to subprismoidal, subangular to subrounded, orange oxidation, trace mica.
144-158	SAND	SP	Light gray to light olive gray, fine-grained, sand grains are subdiscoidal to subprismoidal, subrounded to rounded, trace mica. At 154-158 feet, sand grains are subangular to angular, faint sweet odor.
158-166.5	SAND	SP	Light olive gray, dense, fine- to medium-grained, sand grains are subdiscoidal to subprismoidal, angular to subangular, some mica.
166.5-186.5	SAND	SP	Gray to dark gray, dense, fine-grained, sand grains are subdiscoidal to subprismoidal, angular to subangular; some mica. At 177-186.5 feet sand is becoming finer-grained with depth.

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TABLE A-1
LITHOLOGIC LOG
OF EXPLORATORY BORING EB-1

DEPTH INTERVAL (FEET BELOW LAND SURFACE)		GROUP SYMBOL*	DESCRIPTION OF MATERIAL
186.5-217	SAND	SP	Dark gray, dense, fine sand, well sorted, some silt, some mica. At 197 feet, trace tan shell fragments. At 201 feet, increase in shell fragments.
217-219	SANDY SILT/ SILT	ML	Gray with dark grayish brown, stiff to very stiff, sand is fine-grained, nonplastic, becomes less sandy with depth, occasional silty sand interbeds.
219-238.5	SILT	ML	Gray to dark gray, stiff to very stiff, slightly plastic. At 219-223 feet occasional silty sand interbeds.
TOTAL DEPTH OF BOREHOLE:			238.5 Feet

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TABLE A-2
LITHOLOGIC LOG OF EXPLORATORY BORING EB-2

DEPTH INTERVAL (FEET BELOW LAND SURFACE)		GROUP SYMBOL*	DESCRIPTION OF MATERIAL
0-0.75	ASPHALT AND SUBGRADE		
0.75-7.5	CLAYEY SILT/ SILTY CLAY	ML/CL	Dark grayish brown, stiff, moderately plastic, trace of fine sand.
7.5-16	SILT	ML	Grayish brown, firm to stiff, slightly to moderately plastic, some clay, trace sand. At 14-16 feet becoming more sandy.
16-24.5	SANDY SILT	ML	Brown, firm to stiff, moderately plastic, some clay.
24.5-27	SILTY SAND	SM	Light olive brown, fine-grained.
27-52	SAND	SP	Grayish brown, fine-grained, well sorted, trace mica. At 43-50 feet occasional clayey sand interbeds. At 51-52 feet some shell fragments.
52-56	FOSSILI- FEROUS SILTY SAND	SM	Light olive brown, dense, fine- grained sand, shell fragments, moderately well cemented.
56-63	SAND	SP	Olive, fine-grained, some clayey sand interbeds.
63-67	FOSSILI- FEROUS SAND	SP	Olive gray, fine-grained sand, well cemented shell fragments.

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TABLE A-2
LITHOLOGIC LOG
OF EXPLORATORY BORING EB-2

DEPTH INTERVAL (FEET BELOW LAND SURFACE)		GROUP SYMBOL*	DESCRIPTION OF MATERIAL
67-70.5	FOSSILI- FEROUS SILTY SAND	SM	Pale olive, fine-grained sand, well cemented shell fragments.
70.5-79	INTERBEDDED SAND/ SILTY SAND/ SILT	SP/SM/ML	Sand is olive gray, fine-grained, trace mica; silty sand is olive gray, medium dense to dense, fine- grained, well sorted; silt is very stiff, light olive brown, thinly laminated, slightly plastic; interbeds are about 1 to 3 inches thick, some orange oxidation stains.
79-82	CLAYEY SILT	ML	Olive gray to medium bluish gray, firm to stiff, shaley partings, orange oxide stain on parting surface, some mica and shell fragments, sweet odor.
82-86.5	SAND	SP	Olive to olive gray, fine- to medium-grained, grains are discoidal to subprismatic, subangular to subround, some orange oxide stains, trace mica, predominantly quartz.
86.5-95	INTERBEDDED SAND AND SANDY SILT	SP/ML	Olive sand is fine-grained, some mica; sandy silt is slightly to moderately plastic, trace clay.
95-99	SAND	SP	Olive gray, dense, fine-grained, grains are subdiscoidal to subprismatic, subangular to subrounded, trace of mica, predominantly quartz. At 97 feet, silt interbed, olive with orange oxide staining.
99-102.5	SANDY SILT WITH CLAY	ML	Medium bluish gray, firm to stiff, some mica, trace of shell fragments.

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TABLE A-2
LITHOLOGIC LOG
OF EXPLORATORY BORING EB-2

DEPTH INTERVAL (FEET BELOW LAND SURFACE)		GROUP SYMBOL*	DESCRIPTION OF MATERIAL
102.5-103.5	FOSSILI- FEROUS SILTY SAND	SM	Grayish green, fine-grained sand, abundant shell fragments.
103.5-105	FOSSILI- FEROUS SANDY SILT	ML	Grayish green, dense, fine-grained sand, abundant shell fragments, trace clay, strong sweet odor.
105-107	FOSSILI- FEROUS CLAYEY SAND	SC	Dark greenish gray, dense, fine- grained sand, very abundant shell fragments up to one inch in diameter.
107-113	SAND	SP	Pale olive to brownish yellow, fine- to medium-grained, mottled, dense, grains are discoidal to subprismatic, subangular to subrounded, trace silt, shell fragments, moderately well cemented, crumbles to hard nodules 0.25-0.5 inch in diameter, orange oxide stains throughout. At 110-113 feet, sand is well graded fine to coarse, some shell fragments.
113-124	SAND	SP	Yellowish brown, fine- to medium- grained, distinctive multicolored grains including: black, white, clear, yellow, maroon, orange, red, pink, green; well-cemented sand nodules with shell nucleus. At 119-120 feet becoming less cemented. At 120-124 feet light brownish gray, no cementation.

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TABLE A-2
LITHOLOGIC LOG
OF EXPLORATORY BORING EB-2

DEPTH INTERVAL (FEET BELOW LAND SURFACE)		GROUP SYMBOL*	DESCRIPTION OF MATERIAL
124-131.5	SILT	ML	Olive with medium bluish gray interbeds, firm, some orange oxide stain. At 130-131.5 feet, predominantly bluish gray, silvery micaceous luster; some sand, fine- to medium-grained.
131.5-132.5	SILTY SAND	SM	Medium bluish gray, fine- to medium-grained.
132.5-137.5	SILT	ML	Medium bluish gray to gray to dark greenish gray, firm to hard, some fine sand, non to slightly plastic, some mica.
137.5-138	CLAY	CL	Marbled olive, dark gray and grayish green, soft to firm, plastic.
138-142.5	SAND	SP	Dark greenish gray, fine-grained sand, grains are angular to subangular, subprismatic to subdiscoidal, abundant biotite flakes, trace silt. At 140-142.5 feet, some silt.
142.5-147	INTERBEDDED SAND/ SANDY SILT/ CLAYEY SILT	SP/ML	Dark greenish gray, some orange oxide stains, sand as above.

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TABLE A-2
LITHOLOGIC LOG
OF EXPLORATORY BORING EB-2

DEPTH INTERVAL (FEET BELOW LAND SURFACE)		GROUP SYMBOL*	DESCRIPTION OF MATERIAL
147-165	SAND	SP	Dark greenish gray, fine-grained sand, grains are angular to subangular, subprismatic to subdiscoidal, abundant biotite flakes. At 157.5-165 feet, fine- to medium-grained sand, predominantly fine-grained. At 162.5-165, some silt and sandy silt interbeds, dark greenish gray with some orange oxide stains.
165-166	CLAYEY SILT/ SILT/ SANDY SILT	ML	Clayey silt is very dark brown; silt is light yellowish brown; sandy silt is grayish olive; stiff to very stiff.
166-187.5	SAND	SP	Dark gray, fine-grained, trace to some silt, occasional lenses of silty sand, uniform color throughout, trace cream colored thin shells, some mica, grain colors are: clear, gray and black. At 174-176 feet, frequent silt interbeds, sand is finer. At 179-180 feet, silt interbeds as described at 165-166 feet.
187.5-190	INTERBEDDED SILTY SAND/ SILT/CLAY	SM/ML/CL	Colors vary from gray, blue gray to olive, and brown; abundant shell fragments, some wood chips, twigs, and charcoal.
190-192.5	SILTY SAND	SM	Dark gray, fine-grained sand, well sorted, some mica, shell and wood fragments.

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TABLE A-2
LITHOLOGIC LOG
OF EXPLORATORY BORING EB-2

DEPTH INTERVAL (FEET BELOW LAND SURFACE)		GROUP SYMBOL*	DESCRIPTION OF MATERIAL
192.5-197.5	SILTY SAND/ SANDY SILT	SM/ML	Dark gray, fine-grained sand, well sorted, trace shell and wood fragments. At 195-197.5 feet some shell fragments.
197.5-201	SANDY SHELLS	SP	Predominantly shells with well- graded sand, fine to coarse; trace gravel, trace wood, whole shells.
201-203.5	SANDY SILT/ SILT	ML	Dark gray, sandy silt grading to silt with depth, silt has trace sand, nonplastic to slightly plastic, some shell fragments.
203.5-210	SANDY SILT/ SILTY SAND	ML/SM	Dark gray, very stiff, sand is fine- grained, nonplastic to slightly plastic.
210-215	SANDY SILT/ SILT	ML	Medium dark gray, grades from sandy silt to silt with depth, trace sand in silt, trace wood fragments, nonplastic, some mica. At 213-215 feet, interbeds of clayey silt.
215-221	SILT/ CLAYEY SILT	ML	Medium dark gray, stiff, grading to clayey silt with depth, moderately plastic.
221-222	CLAYEY SILTY SAND	SM	Medium dark gray, approximately equal parts of clay, silt and sand, sand is fine- to medium-grained; moderately to slightly plastic.
222-223	CLAYEY SILT	ML	Medium dark gray, stiff, moderately plastic.

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TABLE A-2
LITHOLOGIC LOG
OF EXPLORATORY BORING EB-2

DEPTH INTERVAL (FEET BELOW LAND SURFACE)		GROUP SYMBOL*	DESCRIPTION OF MATERIAL
223-224.5	CLAYEY SILTY SAND	SM	Same as 221-222 feet.
224.5-226.5	SAND	SP	Dark gray, fine- to medium-grained, grains are well rounded to subrounded, spheroidal to discoidal, grains are predominantly clear and gray with some red and green grains.
226.5-227.5	CLAYEY SAND	SC	Dark gray, fine-grained sand, moderately plastic.
227.5-230	INTERBEDDED SAND/ CLAYEY SAND	SP/SC	Sand is dark gray, fine-grained as described at 224.5-227.5 feet; clayey sand is the same as described above.
230-240	SAND	SP	Gray, fine- to medium-grained, grains are subangular to rounded, subprismoidal to subdiscoidal, grains are predominantly clear and gray with some red, green, yellow and brown grains, some wood. At 232.5 feet, slightly finer grained. At 233-240 feet, occasional clayey sand stringers. At 236.5-238 feet, a few olive gray, very well cemented sand, trace shells.

TOTAL DEPTH OF BOREHOLE: 240 Feet

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TABLE A-3
LITHOLOGIC LOG OF MONITOR WELL BF-1

DEPTH INTERVAL (FEET BELOW LAND SURFACE)		GROUP SYMBOL*	DESCRIPTION OF MATERIAL
0-0.75	ASPHALT AND SUBGRADE MATERIAL		
0.75-5	CLAY	CL	Very dark grayish brown, moist, stiff to very stiff, moderately plastic.
5-12	SILTY SAND	SM	Yellowish brown, moist, loose, fine- grained sand, trace mica and trace calcareous inclusions.
12-14	SANDY SILT	ML	Brown, moist, firm, nonplastic; sand is fine-grained.
14-20	SILT	ML	Brown, moist, firm, nonplastic to slightly plastic, slightly calcareous matrix. At 16-20 feet, trace of fine sand.
20-24	SILTY SAND	SM	Light olive brown, moist, medium dense, fine-grained, sand grains are subangular and subdiscoidal, some mica, noncalcareous. At 22-24 feet, occasional sandy clay stringers approximately 1/8 inch thick.

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TABLE A-3
LITHOLOGIC LOG
OF MONITOR WELL BF-1

DEPTH INTERVAL (FEET BELOW LAND SURFACE)		GROUP SYMBOL*	DESCRIPTION OF MATERIAL
24-40	SAND	SP	Light yellowish brown, moist, medium dense, grains are subangular and subdiscoidal, some mica. At 26-30 feet, orange brown mottle. At 30 feet, calcareous cemented sand. At 34-40 feet, occasional shell fragments 1/8-1/2 inch.
40-43	FOSSILI- FEROUS SAND	SP	Light gray, moist, medium dense, fine-grained sand with angular fossil fragments up to 1/2 inch.
43-44	SANDY SILT	ML	Light olive brown, with orange mottle, stiff, fine-grained sand, non to slightly plastic.
44-51	SAND	SP	Light yellowish brown, moist, medium dense, sand is fine-grained and well sorted, grains are subangular and subdiscoidal, some mica. At 49-51 feet, some orange mottle.
51-53	SAND	SP	Light olive gray, slightly moist to moist, sand is fine-grained and well sorted, some mica, grains are subangular and subdiscoidal to subprismoidal, trace silt.
53-55	SILT	ML	Olive gray, moist, firm to stiff, trace of sand, nonplastic.
55-58	SAND	SP	Pale olive, slightly moist, fine- to medium-grained, grains are spherical to subprismoidal and subangular, some mica.

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TABLE A-3
LITHOLOGIC LOG
OF MONITOR WELL BF-1

DEPTH INTERVAL (FEET BELOW LAND SURFACE)		GROUP SYMBOL*	DESCRIPTION OF MATERIAL
58-60	SILTY SAND	SM	Olive, moist, medium dense, fine-grained sand, grains are angular and subprismatic.
60-62	SAND	SP	Light yellowish brown, slightly moist to moist, fine-grained sand, trace silt, some mica.
62-84	SAND	SP	Light olive gray, fine-grained, occasional silt interbed, some mica, trace to some thin shell fragments.
84-96	FOSSILI- FEROUS SAND	SP	Pale yellow, medium- to fine-grained, grains are subprismatic to subdiscoidal, thin fragmented shells, distinctive multicolored grains including: clear, white, black, green, red, pink.
96-103	SAND	SP	Pale olive, fine-grained sand, some mica, trace shell fragments.
103-126.5	SAND	SP	Pale yellow, medium- to fine-grained, predominantly fine-grained at top of unit, becoming coarser with depth, distinctive grain colors more predominant than before. At 104.5-106 feet, some shell fragments. At 122-124.5 feet, some shell fragments.

TOTAL DEPTH OF BOREHOLE: 126.5 Feet

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TABLE A-4
LITHOLOGIC LOG OF MONITOR WELL BF-2

<u>DEPTH INTERVAL (FEET BELOW LAND SURFACE)</u>		<u>GROUP SYMBOL*</u>	<u>DESCRIPTION OF MATERIAL</u>
0-0.75	ASPHALT AND SUBGRADE MATERIAL		
0.75-7	SILT	ML	<p>Very dark grayish brown slightly moist, stiff, trace of medium- to fine sand, slightly plastic.</p> <p>At 3 feet, inclusions of white powder-like material up to two inches long by 1/4-inch wide.</p> <p>At 4 feet, inclusions of white powder-like material up to two inches long by two inches wide.</p> <p>At 5-7 feet, occasional white stains.</p>
7-9	CLAY	CL	Very dark grayish brown, slightly moist to moist, stiff, trace of fine sand, moderately plastic, occasional white powdery stains.
9-11	SANDY CLAY/ SANDY SILT	CL/ML	Brown, moist, firm, fine-grained sand.
11-21	SANDY SILT	ML	<p>Brown, moist, firm, fine-grained sand.</p> <p>At 16-17 feet, matrix is slightly calcareous.</p>
21-24	CLAYEY SILT	ML	Brown, moist, stiff, some sand, slightly calcareous matrix.
24-26	SANDY SILT	ML	Brown, moist, firm to stiff, calcareous.

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TABLE A-4
LITHOLOGIC LOG
OF MONITOR WELL BF-2

DEPTH INTERVAL (FEET BELOW LAND SURFACE)		GROUP SYMBOL*	DESCRIPTION OF MATERIAL
26-37	SAND	SP	<p>Light yellowish brown, moist, fine-grained sand, grains are subdiscoidal to subprismoidal, trace of silt, trace of mica.</p> <p>At 28-29 feet slight orange brown mottle.</p> <p>At 31-35 well-cemented calcareous sandstone nodules up to two inches in diameter, grains are subrounded and subdiscoidal to subprismoidal.</p>
37-43	FOSSILI- FEROUS SAND	SP	<p>Light gray, medium dense, fine-grained sand with angular fossil fragments, fragments up to 1/8 inch in size, calcareous.</p>
43-45	SILTY SAND	SM	<p>Dark grayish brown, fine-grained sand, frequent dark gray clay interbeds up to 1/2-inch thick, well cemented calcareous shell fragments.</p>
45-46	SILTY SAND	SM	<p>Light olive brown, moist, medium dense, fine-grained sand, grains are prismoidal and angular, some mica.</p>
46-47	SAND	SP	<p>Light yellowish brown, moist, medium dense, fine-grained sand, some mica, grains are angular, spherical to subprismoidal, trace silt.</p>
47-50	CLAYEY SAND	SC	<p>Pale olive, moist, dense, fine sand with some clay, grains are angular and subdiscoidal to subprismoidal.</p> <p>At 50 feet, orange gray mottle.</p>

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TABLE A-4
LITHOLOGIC LOG
OF MONITOR WELL BF-2

DEPTH INTERVAL (FEET BELOW LAND SURFACE)		GROUP SYMBOL*	DESCRIPTION OF MATERIAL
50-57	SAND	SP	Light yellowish brown, moist, medium dense, fine-grained sand, some mica. At 50-52 feet, some gray clay. At 52 feet, thin dark gray clay layer less than 1/2 inch thick, trace calcareous, cemented, angular fragments.
57-64.5	SAND	SP	Light brownish gray, moist, medium dense, predominantly fine sand with some medium-grained sand, trace silt, sand grains are angular and subdiscoidal to subprismoidal, some mica. At 59 feet some orange staining, spherical clay nodule 3/4 inch in diameter. At 60-60.5 feet, some clay. At 62.5-64.5 feet, pale olive.
64.5-99	SAND	SP	Grayish brown, fine-grained sand, trace silty interbeds, silt is light olive brown, slightly plastic, trace shell fragments.
99-108	SILTY SAND	SM	Olive gray, fine-grained sand, some shell fragments.
108-115	SAND	SP	Olive, fine-grained, trace mica, predominantly quartz.

*Unified Soil Classification System
ASTM D-2487



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TABLE A-4
LITHOLOGIC LOG
OF MONITOR WELL BF-2

DEPTH INTERVAL (FEET BELOW LAND SURFACE)		GROUP SYMBOL*	DESCRIPTION OF MATERIAL
115-126	SAND	SP	Light olive gray, fine- to medium-grained sand, some bluish gray silty sand interbeds, distinctive multicolored grains, including: clear, white, gray, black, red, green, pink, trace shell fragments.
126-128	CLAY	CH	Gray, very stiff, highly plastic.
TOTAL DEPTH OF BOREHOLE: 128 Feet			

*Unified Soil Classification System
ASTM D-2487



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TABLE A-5
LITHOLOGIC LOG OF MONITOR WELL BF-3

DEPTH INTERVAL (FEET BELOW LAND SURFACE)		GROUP SYMBOL*	DESCRIPTION OF MATERIAL
0-0.75	ASPHALT AND SUBGRADE MATERIAL		
0.75-6	FILL		Concrete fragments, clay, bricks in silt matrix.
6-8	CLAY	CL	Very dark gray, moist to very moist, stiff, moderately to highly plastic.
8-28	SANDY SILT	ML	Brown, moist, firm, nonplastic. At 21-28 feet, stiff. At 25-28 feet increase in fine sand.
28-44	SAND	SP	Light yellowish brown, moist, medium dense, fine sand with trace silt, mica, sand grains are angular to subangular and subdiscoidal to subprismoidal, some mica.
44-47	FOSSILI- FEROUS SAND	SP	Very abundant calcareous shell fragments in sand matrix, moderately cemented.
47-50	SILTY SAND	SM	Brown, moist, medium dense, fine sand, slightly plastic, some mica.
50-56	SAND WITH CLAYEY SAND INTERBEDS	SP	Light yellowish brown sand and brown clayey sand, moist, medium dense, fine sand interbeds up to six inches thick, sand grains are angular to subangular and spherical to subprismoidal, some mica. At 53-55 feet, decrease in clayey sand interbeds.

*Unified Soil Classification System
ASTM D-2487



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TABLE A-5
LITHOLOGIC LOG
OF MONITOR WELL BF-3

DEPTH INTERVAL (FEET BELOW LAND SURFACE)		GROUP SYMBOL*	DESCRIPTION OF MATERIAL
56-64	SAND	SP	Light yellowish brown to yellowish brown, moist, medium dense, fine sand, trace silt, sand grains are angular to subangular and spherical to subprismatic, some mica. At 59 feet, pale olive.
64-71	SAND	SP	Pale olive, fine-grained sand with frequent silty sand interbeds, sand is predominantly quartz, grains are subangular and subdiscoidal to subprismatic.
71-87	SILT	ML	Light olive brown, some fine-grained sand, slightly to moderately plastic.
87-91	SILTY SAND	SM	Olive, fine-grained sand, some shell fragments.
91-100	SAND	SP	Olive, fine-grained sand, some silt, occasional olive colored silt interbeds. At 98-100 feet, thin stringers of medium- to fine-grained sand.
100-103	SANDY SILT	ML	Olive, fine-grained sand, occasional interbeds of fine-grained sand, nonplastic.
103-106	SILTY FOSSILI- FEROUS SAND	SM	Dusky yellow green, fine-grained sand, abundant shells and shell fragments; shells are thin, white and tan in color.
106-109	FOSSILI- FEROUS SAND	SP	Grayish olive green, fine-grained sand, trace silt, shells as above.

*Unified Soil Classification System
ASTM D-2487



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TABLE A-5
LITHOLOGIC LOG
OF MONITOR WELL BF-3

DEPTH INTERVAL (FEET BELOW LAND SURFACE)		GROUP SYMBOL*	DESCRIPTION OF MATERIAL
109-118	SAND	SP	Pale olive to brownish yellow, fine- to medium-grained sand, occasional lenses of cemented sand, some shell fragments. At 112-115 feet predominantly brownish yellow in color, slightly coarser.
118-125.2	SAND	SP	Olive, medium- to fine-grained, distinctive multicolored grains, including: clear, white, black, green, red, pink.
125.2-125.5	SANDY SILT	ML	Olive, fine-grained sand, slightly plastic, some mica.
TOTAL DEPTH OF BOREHOLE:			125.5 Feet

*Unified Soil Classification System
ASTM D-2487



HARGIS + ASSOCIATES, INC.

TABLE A-6
LITHOLOGIC LOG OF MONITOR WELL BF-4

DEPTH INTERVAL (FEET BELOW LAND SURFACE)		GROUP SYMBOL*	DESCRIPTION OF MATERIAL
0-0.75	ASPHALT AND SUBGRADE MATERIAL		
0.75-7.5	FILL		Concrete fragments, bricks, in clayey silt matrix.
7.5-28	SANDY SILT	ML	Yellowish brown, moist, firm, fine- grained sand, slightly plastic.
28-55	SAND	SP	Light yellowish brown, moist, medium dense, fine-grained with trace silt, grains are subangular to subrounded and subdiscoidal, some mica. At 31-32 feet, marine clam fragments up to two inches, calcareous, soft. At 50-52 feet, calcareous fossil fragments, moderately well cemented.
56-96	SAND	SP	Light yellowish brown, fine-grained, frequent pale olive sandy silt interbeds, nonplastic, trace shells, trace charcoal.
96-100	SAND	SP	Light brownish gray, fine-grained, frequent light olive brown silt interbeds.
100-106	SAND	SP	Light yellowish brown, fine- to medium-grained, some thin yellow to brownish yellow fossil fragments.

*Unified Soil Classification System
ASTM D-2487



HARGIS + ASSOCIATES, INC.

TABLE A-6
LITHOLOGIC LOG
OF MONITOR WELL BF-4

DEPTH INTERVAL (FEET BELOW LAND SURFACE)		GROUP SYMBOL*	DESCRIPTION OF MATERIAL
106-125.75	SAND	SP	Pale olive, fine- to medium-grained sand, coarsens with depth, some shell fragments, multicolored grains becoming more distinctive with depth including: black, white, clear, green, orange, yellow, red, and purple.
125.75-126	SANDY SILT	ML	Light olive brown, sand is fine- to medium-grained, slightly plastic to nonplastic.

TOTAL DEPTH: 126 Feet

*Unified Soil Classification System
ASTM D-2487



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TABLE A-7
LITHOLOGIC LOG OF MONITOR WELL G-1

DEPTH INTERVAL (FEET BELOW LAND SURFACE)		GROUP SYMBOL*	DESCRIPTION OF MATERIAL
0-0.75	ASPHALT AND SUBGRADE		
0.75-4	CLAY	CL	Dark gray, moderately to highly plastic.
4-22.5	SANDY SILT	ML	Light olive brown, fine-grained sand, nonplastic to slightly plastic.
22.5-30	SILTY SAND	SM	Light olive brown, fine-grained sand, trace clay, trace mica. At 27 feet, white shell fragments.
30-45	FOSSILI- FEROUS SAND	SP	Light yellowish brown, fine-grained sand, abundant shell fragments. At 39-40 feet, moderate cementation. At 43 feet, some thin silt interbeds.
45-52	SILTY SAND	SM	Light olive brown, fine-grained sand, occasional thin silt interbeds.
52-57	CLAYEY SILT	ML	Light olive brown, some silty sand interbeds, fine-grained sand, some mica; moderately plastic.
57-63	SAND	SP	Light olive brown, fine-grained, trace silt.
63-66	CLAYEY SILT/ CLAYEY SAND	ML/SC	Light olive brown, interbedded clayey silt and clayey sand, fine-grained sand, clayey silt is moderately plastic.
66-78	SAND	SP	Olive, fine-grained, some silt.

*Unified Soil Classification System
ASTM D-2487



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TABLE A-7
LITHOLOGIC LOG
OF MONITOR WELL G-1

DEPTH INTERVAL (FEET BELOW LAND SURFACE)		GROUP SYMBOL*	DESCRIPTION OF MATERIAL
78-80	CLAYEY SAND	SC	Light olive brown, fine-grained sand, moderately plastic.
80-85	SAND	SP	Pale olive, fine- to medium-grained, trace silt; some shells.
85-96	FOSSILI- FEROUS SAND	SP	Same as above but with abundant shells and shell fragments.
96-102	CLAYEY SAND	SC	Pale olive; sand is fine-grained, moderately plastic, trace mica.
102-105	SILTY SAND	SM	Pale olive, fine-grained sand, trace shell fragments.
105-126	SAND	SP	Olive yellow, fine- to medium-grained, grain size increasing with depth, occasional silty interbeds; multicolored grains including: black, white, clear, green, orange, yellow, red and purple are increasingly distinctive with depth.
126-127	CLAY TO SANDY CLAY	CL	Olive yellow, fine-grained sand, moderately plastic.
127-129	SAND	SP	Pale olive, fine- to medium-grained.
129-131	SILT	ML	Pale olive, slightly plastic.
131-136	SAND	SP	Medium bluish gray, fine-grained, frequent interbeds of silt as above decreasing in frequency with depth.

*Unified Soil Classification System
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TABLE A-7
LITHOLOGIC LOG
OF MONITOR WELL G-1

DEPTH INTERVAL (FEET BELOW LAND SURFACE)	GROUP SYMBOL*	DESCRIPTION OF MATERIAL
136-164.5 SAND	SP	<p>Light brownish gray, fine-grained, trace of medium-grained sand, grains are subprismatic to subdiscoidal, angular to subrounded, trace shells.</p> <p>At 136-145, trace brown sandy silt interbeds decreasing in frequency with depth.</p> <p>At 159.5-164.5 feet, color grades to light olive gray, grain size decreases slightly, trace medium-grained sand.</p>

TOTAL DEPTH OF BOREHOLE: 164.5 Feet

*Unified Soil Classification System
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TABLE A-8
LITHOLOGIC LOG OF MONITOR WELL G-2

DEPTH INTERVAL (FEET BELOW LAND SURFACE)		GROUP SYMBOL*	DESCRIPTION OF MATERIAL
0-0.75	ASPHALT AND SUBGRADE		
0.75-28.5	SANDY SILT	ML	Olive brown to light olive brown, slightly plastic.
28.5-67	SAND	SP	Light olive brown, predominantly fine-grained, trace coarse sand and fine gravel. At 31 feet, clayey silt interbeds. At 51 feet, some shell fragments. At 52-58 feet, trace shell fragments At 54-60 feet, occasional well cemented intervals.
67-84	SANDY SILT	ML	Light olive brown, slightly plastic. At 77 feet, some shells.
84-92	SILTY SAND	SM	Light olive brown, fine-grained sand, nonplastic, some shells.
92-108	SANDY SILT	ML	Light olive brown, fine-grained sand, some shell fragments. At 103-108 feet, occasional dark gray silt interbeds with some clay.
108-110	SILT	ML	Dark gray, some clay, slightly plastic.

*Unified Soil Classification System
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TABLE A-8
LITHOLOGIC LOG
OF MONITOR WELL G-2

DEPTH INTERVAL (FEET BELOW LAND SURFACE)		GROUP SYMBOL*	DESCRIPTION OF MATERIAL
110-131	SAND	SP	Brownish yellow, fine- to medium-grained, trace silt, some orange shell fragments, some poorly-cemented sand grains.
131-136	SANDY SILT	ML	Grayish brown, fine-grained sand, slightly plastic, frequent silt interbeds.
136-150	INTERBEDDED SILT/ SANDY SILT/ SILTY SAND	ML/SM	Silt is olive, fine-grained sand, sandy silt and silty sand are gray, all are slightly to moderately plastic, medium-strong sweet odor in cuttings. At 144-150 feet, interbeds of clayey silt, grayish green, light olive brown, and olive in color.
150-180	SAND	SP	Greenish gray, fine-grained sand, trace silt, some mica. At 150-153 feet, trace medium-grained sand. At 166-180 feet, trace thin silty interbeds.
TOTAL DEPTH OF BOREHOLE:			180 Feet

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TABLE A-9
LITHOLOGIC LOG OF MONITOR WELL G-3

DEPTH INTERVAL (FEET BELOW LAND SURFACE)		GROUP SYMBOL*	DESCRIPTION OF MATERIAL
0.0-0.75	ASPHALT AND SUBGRADE		
0.75-8.0	FILL		Dark brown clay matrix, moderately to highly plastic with concrete bricks, and wood fragments.
8.0-25	CLAYEY SANDY SILT	ML	Light olive brown to olive brown, slightly to moderately plastic.
25-39	SILTY SAND	SM	Light olive brown, fine-grained sand, some mica. At 36-39, some thinly layered, oyster-like shell fragments.
39-46	FOSSILI- FEROUS SAND	SP	Brownish yellow, fine-grained sand, abundant thinly layered, oyster-like shell fragments, shells slightly cemented.
46-77	SAND	SP	Olive, fine-grained sand, some silt and silty sand interbeds, trace mica.
77-100	SANDY SILT	ML	Olive, fine-grained sand, some thinly layered, oyster-like shells. At 94-98 feet, trace shells.
100-104	INTERBEDDED CLAYEY SILT, SILT, AND SANDY SILT	ML	Light olive brown clayey silt and silt; also, grayish olive green sandy silt and silt, some shells.

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TABLE A-9
LITHOLOGIC LOG
OF MONITOR WELL G-3

DEPTH INTERVAL (FEET BELOW LAND SURFACE)		GROUP SYMBOL*	DESCRIPTION OF MATERIAL
104-117	SILTY SAND INTERBEDDED WITH CLAYEY SILT, SILT, AND SANDY SILT	SM	Silty sand and sandy silt are grayish olive green to grayish green; silt is light olive brown; sand is fine-grained with some shells.
117-128	SAND	SP	Pale olive, fine- to medium-grained, distinctive multicolored grains including: black, white, clear, green, orange, yellow, red, purple.
128-131	CLAYEY SAND	SC	Grayish green, fine-grained sand, moderately plastic.
131-133	SAND	SP	Greenish gray, fine- to medium-grained, predominantly fine-grained, trace silt.
133-134	SILTY SAND	SM	Greenish gray, fine-grained sand, some mica, some interbeds of fine-grained sand.
134-135.5	SAND	SP	Same as sand at 131-133 feet with some mica. At 135-135.5 feet, extensive orange oxidation.
135.5-137	SILT	ML	Medium bluish gray, dry, slightly indurated, slightly plastic, trace of fine white crystals; silt is thinly laminated. At 136.3-136.5 feet, medium bluish gray clayey sand.

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TABLE A-9
LITHOLOGIC LOG
OF MONITOR WELL G-3

DEPTH INTERVAL (FEET BELOW LAND SURFACE)		GROUP SYMBOL*	DESCRIPTION OF MATERIAL
137-138.5	SILT/SHALE	ML	Grayish olive green with some orange oxidation, dry to slightly moist, moderately indurated, slightly to moderately plastic, material is marbled with medium bluish gray silt.
138.5-170	SAND	SP	Light olive gray, fine- to medium-grained, predominantly fine-grained, grains are subdiscoidal to subprismoidal and subangular to subrounded, some silt; trace silty sand interbeds; trace mica.

TOTAL DEPTH OF BOREHOLE: 170 Feet

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BOE-C6-0184006

TABLE A-10
LITHOLOGIC LOG OF MONITOR WELL LG-1

DEPTH INTERVAL (FEET BELOW LAND SURFACE)		GROUP SYMBOL*	DESCRIPTION OF MATERIAL
0-0.75	ASPHALT AND SUBGRADE MATERIAL		
0.75-28.5	SANDY SILT	ML	Light olive brown, slightly to moderately plastic; sand is fine-grained.
28.5-37	SAND	SP	Brown, fine-grained, some silt.
37-42	FOSSILI- FEROUS SAND	SP	Fine-grained sand with calcareous shell fragments, moderately well cemented.
42-52	SILTY SAND	SM	Brown, fine-grained. At 50-52 feet, orange oxide staining.
52-70	SAND	SP	Olive brown, fine-grained, some silt.
70-80	SILT	ML	Olive, some fine-grained sand, slightly plastic, some mica, some iron oxide staining. At 75-79 feet, trace of very thin shell fragments, increasing with depth.
80-85	SANDY SILT/ SILTY SAND	ML/SM	Olive gray, approximately equal amounts of silt and fine-grained sand, slightly plastic. At 81-82 feet, some interbeds of neutral gray clay, some shell fragments.

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TABLE A-10
LITHOLOGIC LOG
OF MONITOR WELL LG-1

DEPTH INTERVAL (FEET BELOW LAND SURFACE)		GROUP SYMBOL*	DESCRIPTION OF MATERIAL
85-91	SAND	SP	Olive gray, fine-grained.
91-99	SILT	ML	Olive gray to brown, slightly plastic.
99-101	SAND	SP	Olive gray, fine-grained.
101-102	SANDY SILT/ SILTY SAND	ML/SM	Olive, approximately equal parts fine-grained sand and silt.
102-106	CLAYEY SILT	ML	Gray to olive, slightly to moderately plastic, trace to some shells increasing with depth.
106-125	SAND	SP	Brownish yellow, fine- to medium-grained, trace silt, some orange shell fragments, some poorly cemented sand and shells. At 116-117 feet increase in shell fragments. At 120-123 feet sand is fine-grained, no cementation.
125-132	SILT	ML	Light olive brown, some clay, occasional grayish green silty sand interbeds.
132-135	SILTY SAND	SM	Grayish green, fine- to medium-grained sand, trace clay, occasional grayish green and light olive brown silt interbeds.
135-141	SILTY SAND/ SANDY SILT	SM/ML	Grayish olive green with a micaceous luster, approximately equal amounts of fine-grained sand and silt grading to predominantly silt with depth, nonplastic, trace shell fragments.

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TABLE A-10
LITHOLOGIC LOG
OF MONITOR WELL LG-1

DEPTH INTERVAL (FEET BELOW LAND SURFACE)		GROUP SYMBOL*	DESCRIPTION OF MATERIAL
141-142	SILT	ML	Gray, slightly to moderately plastic.
142-172	SAND	SP	Gray, fine-grained sand, trace silty interbeds. At 160-167 feet, some medium-grained sand.
172-175	SAND/ SILTY SAND	SP/SM	Dark gray, approximately equal amounts of sand and silt, sand is predominantly fine-grained with a trace of medium-sized grains.
175-197.5	SAND	SP	Gray, fine-grained sand, trace silt, trace mica, trace thin brownish yellow shell fragments, trace wood fragments. At 191-197.5 feet, some brownish yellow shell fragments, some wood fragments, some charcoal.
197.5-200	FOSSILI- FEROUS SAND	SP	Abundant whole marine fossils well preserved in sand matrix, some wood fragments and charcoal.
200-207	SAND	SP	Same as 175-197.5 feet.
207-209	SANDY SILT	ML	Dark gray, soft, fine-grained sand, nonplastic to slightly plastic.
209-211	SANDY SILTY CLAY	CL	Dark gray, stiff, some fine-grained sand, moderately plastic.
TOTAL DEPTH OF BOREHOLE:			211 Feet

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APPENDIX C

AS-BUILT WELL CONSTRUCTION DATA



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APPENDIX C

AS-BUILT WELL CONSTRUCTION DATA

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AS-BUILT WELL CONSTRUCTION DATA

TABLE C-1
AS-BUILT WELL CONSTRUCTION DATA

<u>WELL ID</u>	<u>TOTAL DEPTH DRILLED (Feet b/s)</u>	<u>14-INCH DIAMETER CONDUCTOR CASING DEPTH (Feet b/s)</u>	<u>4-INCH DIAMETER PVC BLANK CASING INTERVAL (Feet b/s)</u>	<u>4-INCH DIAMETER 316L BLANK CASING INTERVAL (Feet b/s)</u>	<u>4-INCH DIAMETER 316L WIRE WRAP SCREEN INTERVAL (Feet b/s)</u>	<u>FILTER PACK INTERVAL (Feet b/s)</u>	<u>SCREEN SLOT SIZE (Inches)</u>	<u>FILTER PACK SIZE*</u>	<u>BENTONITE/SAND SEAL INTERVAL (Feet b/s)</u>	<u>INTER-CASING CEMENT GROUT SEAL (Feet b/s)</u>
BF-1	126.5	65.5	0.0-73.5	73.5-113.5	113.5-124.0	110.5-126.5	0.045	No. 6-16	102-110.5	0.0-102
BF-2	128.0	66.2	0.0-54.0	54.0-114.0	114.0-124.5	111-128.0	0.045	No. 6-16	103.5-111	0.0-103.5
BF-3	125.5	65.5	0.0-51.5	51.5-113.5	113.5-124.0	110-125.5	0.045	No. 6-16	102-110	0.0-102
BF-4	126.0	42.0	0.0-51.0	51.0-112.0	112.0-123.0	108.5-126.0	0.045	No. 6-16	100-108.5	0.0-100
G-1	164.5	135.1	0.0-60.0	60.0-140.5	140.5-161.0	136-164.5	0.020	No. 8-20	127-136	0.0-127
G-2	180.0	140.4	0.0-60.0	60.0-155.0	155.0-175.5	153-180.0	0.020	No. 8-20	118-153	0.0-118
G-3	170.0	130.0	0.0-60.5	60.5-145.5	145.5-166.0	143-170.0	0.020	No. 8-20	127-143	0.0-127
LG-1	211.0	172.2	0.0-63.5	63.5-188.5	188.5-209.0	180-211.0	0.010	No. 30-50	167.5-180	0.0-167.5

* Filter pack consists of Monterey sand, filter size is given in U.S. Sieve Numbers.



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APPENDIX D

WELL DEVELOPMENT DATA



APPENDIX D

WELL DEVELOPMENT DATA

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D-8	WELL RECOVERY DATA, WELL NO. G-3
D-9	WELL RECOVERY DATA, WELL NO. LG-1



WELL DEVELOPMENT PROCEDURES

The monitor wells constructed during this phase were developed by bailing, swabbing, and pumping. After construction, each well was bailed using a suction bailer to remove the sediment from the well. After bailing, the screened interval was swabbed in discrete intervals. When necessary, the suction bailer was utilized again to remove the sediment. This procedure was repeated as necessary.

After bailing and swabbing, the wells were pumped until the water was clear. The static water level, discharge rate, pumping duration, drawdown at the end of pumping and well recovery after pumping were recorded.

TABLE D-1
WELL DEVELOPMENT PUMPING SUMMARY

WELL ID	DEPTH TO STATIC WATER (Feet, btoc) ¹	DURATION OF PUMPING (Minutes)	AVERAGE DISCHARGE RATE (gpm) ²	DRAWDOWN AT END OF PUMPING (Feet)
BF-1	72.5	71	3.9	4.6
BF-2	78.8	103	4.6	2.5
BF-3	77.6	77	5.9	1.7
BF-4	76.2	61	5.2	3.4
G-1	74.8	447	4.2	21.1
G-2	68.8	90	5.9	32.0
G-3	75.5	267	6.2	16.5
LG-1	73.3	144	3.2	97.4 ³

- ¹ btoc - Below top of casing. Measurements were made prior to casings being trimmed and surveyed.
- ² gpm - Gallons per minute.
- ³ Drawdown reached pump intake after 26 minutes. Discharged stabilized at 3.2 gpm.



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TABLE D-2
WELL RECOVERY DATA
DECEMBER 17, 1986.
WELL NO. BF-1

ESTIMATED TIME SINCE PUMPING* STOPPED (Minutes:Seconds)	DEPTH TO WATER (Feet)
30:00	75.95
33:00	75.95
34:26	75.94
35:53	75.94
37:00	75.94
41:24	75.94
53:33	75.92

* Early recovery data were not obtained because the pump shut off prematurely due to a generator malfunction. The time pumping stopped was estimated.



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TABLE D-3
WELL RECOVERY DATA
DECEMBER 16, 1986.
WELL NO. BF-2

<u>TIME SINCE PUMPING STOPPED (Minutes:Seconds)</u>	<u>DEPTH TO WATER (Feet)</u>
0:19	80.00
1:19	78.00
1:50	77.00
2:00	77.63
3:00	77.55
4:00	77.52
49:00	77.46



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TABLE D-4
WELL RECOVERY DATA
DECEMBER 11, 1986.
WELL NO. BF-3

<u>TIME SINCE PUMPING STOPPED (Minutes:Seconds)</u>	<u>DEPTH TO WATER (Feet)</u>
0:22	77.77
0:56	77.33
1:25	77.26
2:03	77.24
2:51	77.22
4:06	77.21



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TABLE D-5
WELL RECOVERY DATA
DECEMBER 11, 1986
WELL NO. BF-4

<u>TIME SINCE PUMPING STOPPED (Minutes:Seconds)</u>	<u>DEPTH TO WATER (Feet)</u>
0:26	77.38
0:53	76.43
1:33	76.00
2:04	75.92
2:48	75.88
5:00	75.83
8:00	75.81



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TABLE D-6
WELL RECOVERY DATA
DECEMBER 15, 1986.
WELL NO. G-1

TIME SINCE PUMPING STOPPED (Minutes:Seconds)	DEPTH TO WATER (Feet)
2:19	86.79
4:24	81.77
4:58	81.29
6:54	78.04
8:54	76.64
10:54	75.81
20:54	74.91
37:54	74.85
63:54	74.89



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TABLE D-7
WELL RECOVERY DATA
DECEMBER 10, 1986.
WELL NO. G-2

<u>TIME SINCE PUMPING STOPPED (Minutes:Seconds)</u>	<u>DEPTH TO WATER (Feet)</u>
0:35	98.00
1:00	95.00
1:45	90.00
2:45	85.00
3:30	82.00
4:15	80.00
6:35	75.00
8:20	74.00
14:15	73.00



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TABLE D-8
WELL RECOVERY DATA
DECEMBER 16, 1986.
WELL NO. G-3

<u>TIME SINCE PUMPING STOPPED (Minutes:Seconds)</u>	<u>DEPTH TO WATER (Feet)</u>
0:51	85.00
2:12	80.00
3:57	78.00
9:00	77.66
11:00	77.58
15:00	77.64
37:00	77.62
120:00	77.58



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TABLE D-9
WELL RECOVERY DATA
DECEMBER 11, 1986.
WELL NO. LG-1

<u>TIME SINCE PUMPING STOPPED (Minutes:Seconds)</u>	<u>DEPTH TO WATER (Feet)</u>
3:00	150.00
4:33	145.00
12:05	125.00
19:40	110.00
22:09	105.00
26:45	100.00
37:10	90.00
41:45	87.00
47:15	84.00
70:00	77.34
85:00	75.50
104:00	74.40
156:00	73.49
916:00	73.95



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APPENDIX E

STATIC WATER LEVEL AND GROUNDWATER SAMPLING DATA



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APPENDIX E

STATIC WATER LEVEL AND GROUNDWATER SAMPLING DATA

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TABLE E-1

STATIC WATER LEVELS FROM JANUARY 1987 SAMPLING ROUNDS

WELL ID	DATE	REFERENCE POINT ELEVATION (Feet amsl) ¹	DEPTH TO WATER BELOW REFERENCE POINT (Feet)	WATER LEVEL ELEVATION (Feet bmsl) ²	METHOD OF MEASURING
MW-1	01-07-87	42.83	68.09	-25.26	Steel Tape
MW-1	01-12-87	42.83	68.11	-25.28	Steel Tape
MW-2	01-07-87	48.79	73.46	-24.67	Steel Tape
MW-2	01-12-87	48.79	73.48	-24.69	Steel Tape
MW-3	01-07-87	47.41	72.47	-25.06	Steel Tape
MW-3	01-12-87	47.41	72.32	-24.91	Steel Tape
MW-4	01-07-87	46.69	71.79	-25.10	Steel Tape
MW-4	01-12-87	46.69	71.36	-24.67	Steel Tape
MW-5	01-07-87	44.95	70.03	-25.08	Steel Tape
MW-5	01-12-87	44.95	69.80	-24.85	Steel Tape
BF-1	01-06-87	48.12	72.76	-24.64	Steel Tape
BF-1	01-12-87	48.12	72.64	-24.52	Steel Tape

¹ amsl - above mean sea level.
Reference point elevations of all monitor wells were surveyed 01-12-87. Bladder pump installation required some MW-well casings to be trimmed resulting in new reference point elevations.

² bmsl - below mean sea level.



HARGIS + ASSOCIATES, INC.

TABLE E-1 (continued)
 STATIC WATER LEVELS FROM JANUARY 1987 SAMPLING ROUNDS

WELL ID	DATE	REFERENCE POINT ELEVATION (Feet amsl) ¹	DEPTH TO WATER BELOW REFERENCE POINT (Feet)	WATER LEVEL ELEVATION (Feet bmsl) ²	METHOD OF MEASURING
BF-2	01-06-87	49.40	74.26	-24.86	Steel Tape
BF-2	01-12-87	49.40	74.18	-24.78	Steel Tape
BF-3	01-06-87	48.27	73.24	-24.97	Sounder
BF-3	01-12-87	48.27	73.08	-24.81	Steel Tape
BF-4	01-06-87	47.62	72.64	-25.02	Steel Tape
BF-4	01-12-87	47.62	72.54	-24.92	Steel Tape
G-1	01-06-87	46.68	71.70	-25.02	Steel Tape
G-1	01-12-87	46.68	71.55	-24.87	Steel Tape
G-2	01-06-87	43.24	69.01	-25.77	Steel Tape
G-2	01-12-87	43.24	68.88	-25.64	Steel Tape
G-3	01-06-87	49.51	74.83	-25.32	Steel Tape
G-3	01-12-87	49.51	74.70	-25.19	Steel Tape

¹ amsl - above mean sea level.
 Reference point elevations of all monitor wells were surveyed 01-12-87. Bladder pump installation required some MW-well casings to be trimmed resulting in new reference point elevations.

² bmsl - below mean sea level.



HARGIS + ASSOCIATES, INC.

TABLE E-1 (continued)
 STATIC WATER LEVELS FROM JANUARY 1987 SAMPLING ROUNDS

WELL ID	DATE	REFERENCE POINT ELEVATION (Feet amsl) ¹	DEPTH TO WATER BELOW REFERENCE POINT (Feet)	WATER LEVEL ELEVATION (Feet bmsl) ²	METHOD OF MEASURING
LG-1	01-06-87	43.08	68.88	-25.80	Steel Tape
LG-1	01-12-87	43.08	68.75	-25.67	Steel Tape

- 1 amsl - above mean sea level.
 Reference point elevations of all monitor wells were surveyed 01-12-87. Bladder pump installation required some MW-well casings to be trimmed resulting in new reference point elevations.
- 2 bmsl - below mean sea level.



HARGIS + ASSOCIATES, INC.

TABLE E-2

MONITOR WELL SAMPLING INFORMATION FROM JANUARY 1987 SAMPLING ROUNDS

WELL ID	DATE	TIME PUMP ON	TIME OF SAMPLING	AVERAGE DISCHARGE RATE (gpm)*	NUMBER OF GALLONS PER ONE CASING VOLUME	NUMBER OF GALLONS PURGED	ELECTRICAL CONDUCTIVITY (umhos)	pH	TEMPERATURE °C
MW-1	01-09-87	14:35	15:10	0.3	3	9	5,550	6.0	23.0
MW-1	01-12-87	12:40	13:30	0.2	3	10	6,000	6.8	23.4
MW-2	01-09-87	15:50	16:20	0.3	2	9	---	---	---
MW-2	01-13-87	08:05	08:40	0.2	2	8	13,300	6.2	21.1
MW-3	01-09-87	12:55	13:15	0.3	1	5	1,436	6.0	---
MW-3	01-14-87	08:15	09:00	0.1	1	6	1,220	7.0	20.3
MW-4	01-09-87	11:40	12:10	0.1	2	4	3,540	6.0	21.0
MW-4	01-13-87	11:40	12:10	0.3	2	8	3,180	6.5	22.2
MW-5	01-09-87	09:20	10:00	0.2	1	8	3,390	6.0	22.0
MW-5	01-12-87	---	17:00	---	1	9	3,830	6.7	22.5
BF-1	01-08-87	11:59	12:35	5.2	35	190	984	7.0	23.0
BF-1	01-13-87	13:35	14:15	5.5	35	220	893	7.7	21.8
BF-2	01-07-87	15:32	17:00	5.8	35	510	987	7.0	21.0
BF-2	01-13-87	09:55	10:50	4.0	35	220	892	7.3	22.5

* gpm - Gallons per minute



HARGIS + ASSOCIATES, INC.

TABLE E-2
MONITOR WELL SAMPLING INFORMATION FROM JANUARY 1987 SAMPLING ROUNDS
(continued)

<u>WELL ID</u>	<u>DATE</u>	<u>TIME PUMP ON</u>	<u>TIME OF SAMPLING</u>	<u>AVERAGE DISCHARGE RATE (gpm)*</u>	<u>NUMBER OF GALLONS PER ONE CASING VOLUME</u>	<u>NUMBER OF GALLONS PURGED</u>	<u>ELECTRICAL CONDUCTIVITY (umhos)</u>	<u>pH</u>	<u>TEMPERATURE °C</u>
BF-3	01-08-87	13:33	14:20	7.0	35	330	1,463	6.8	23.5
BF-3	01-13-87	15:15	15:35	8.1	35	160	1,369	7.4	21.5
BF-4	01-08-87	15:11	15:55	7.0	35	310	983	6.8	22.0
BF-4	01-13-87	16:05	16:30	7.7	35	190	967	7.4	23.5
G-1	01-08-87	08:43	10:45	4.3	70	520	505	9.7	22.5
G-1	01-13-87	11:15	13:00	3.2	70	340	479	10.1	22.2
G-2	01-07-87	10:45	12:10	5.0	70	430	638	8.5	22.0
G-2	01-12-87	12:13	14:17	4.8	70	600	692	9.1	24.1
G-3	01-07-87	15:32	17:45	4.6	70	610	553	7.5	20.5
G-3	01-13-87	08:30	09:35	3.7	70	240	520	8.6	22.2
LG-1	01-07-87	10:45	14:25	2.0	70	440	426	9.0	22.0
LG-1	01-12-87	12:13	15:15	1.4	90	250	368	10.0	24.0

* gpm - Gallons per minute



HARGIS, + ASSOCIATES, INC.

Appendix F



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APPENDIX F

HNU READINGS AND WEATHER DESCRIPTIONS



APPENDIX F
HNU READINGS AND WEATHER DESCRIPTIONS

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TABLE F-1
SUMMARY OF HNU READINGS
FROM SOIL SAMPLES

BF-1

DATE	SAMPLE DEPTH (Feet)	SOIL SAMPLE READING (ppm)*	BACKGROUND READING (ppm)*
09-16-86	1	20	1.6
	2	90	1.6
	3	80	1.6
	7	60	1.6
	10	40	1.6
	11	80	1.6
	12	15	1.6
	14	50	1.6
	15	24	
	16	30	
	17	110	
	18	60	
	19	44	
	20	32	
	21	54	50 (Probe extension contaminated)
	22	5.0	
	23	3.0	
	24	1.0	
	25	0.4	
	26	0.4	
	27	1.0	
	28	1.0	
	29	0.6	
	30	0.8	
	31	0.5	
	32	0.6	
	33	0.6	
	34	1.0	
	35	1.2	0.2
	37	0.4	
	38	0.4	
	39	0.4	
	40	0.2	
	41	0.2	
	42	0.2	0.2
	43	0.4	
	45	0.2	
	46	0.4	
	47	0.2	
	48	0.6	
	49	0.2	
	50	0.6	0.2

* Readings are in equivalent
parts per million (ppm) of benzene.



HARGIS + ASSOCIATES, INC.

TABLE F-1 (continued)
SUMMARY OF HNU READINGS
FROM SOIL SAMPLES BF-1

<u>DATE</u>	<u>SAMPLE DEPTH (Feet)</u>	<u>SOIL SAMPLE READING (ppm)*</u>	<u>BACKGROUND READING (ppm)*</u>
09-16-86	51	0.2	
	52	0.2	
	53	0.2	
	54	0.2	0.2
	55	0.4	
	56	0.6	
	57	0.6	
	58	0.6	0.2
	59	0.6	
	60	0.2	0.2
	61	0.4	
	62	0.2	
	63	0.2	0.2
	64	0.2	

* Readings are in equivalent
parts per million (ppm) of benzene.



HARGIS + ASSOCIATES, INC.

TABLE F-2
SUMMARY OF HNU READINGS
FROM SOIL SAMPLES

BF-2

DATE	SAMPLE DEPTH (Feet)	SOIL SAMPLE READING (ppm)*	BACKGROUND READING (ppm)*
09-17-86	1	5.8	
	2	7.0	
	3	11.0	
	4	9.2	
	5	9.0	
	6	13.4	
	8	26.0	
	11	3.0	
	12	6.8	
	13	4.0	0.2
	14	5.2	0.2
	15	3.8	
	17	3.0	0.2
	18	8.8	
	22	2.8	
	24	1.6	
	25	3.0	0.2
	27	2.2	
	29	4.6	0.2
	30	2.8	
	31	1.2	
	33	2.2	0.2
	34	1.0	0.2
	35	0.8	
	37	2.8	0.2
	38	2.2	
	39	7.0	
	40	3.6	
	41	3.8	
	44	0.8	0.2
	45	1.2	
	47	2.0	
	49	1.2	0.2
	51	1.0	
	53	1.6	0.2
	56	4.8	0.2
	57	10.8	0.6
	58	5.2	0.2
	60	6.4	
	62	4.0	0.4
	65	5.2	0.4

* Readings are in equivalent parts per million (ppm) of benzene.



HARGIS + ASSOCIATES, INC.

TABLE F-3
SUMMARY OF HNU READINGS
FROM SOIL SAMPLES

BF-3

DATE	SAMPLE DEPTH (Feet)	SOIL SAMPLE READING (ppm)*	BACKGROUND READING (ppm)*
09-18-86	1	10.0	0.6
	2	17.0	5.0
	5	5.2	4.0
	6	4.8	
	7	4.6	3.8
	9	5.2	3.8
	11	4.6	0.2
	12	4.2	1.2
	14	4.4	1.2
	15	3.6	
	16	3.4	
	20	3.4	1.0
	23	3.2	
	26	5.2	0.9
	28	3.6	0.2
	30	4.2	
	31	8.2	0.2
	33	2.6	0.2
	36	1.2	0.2
	38	3.6	0.2
	40	3.0	0.2
	42	6.0	0.2
	47	1.2	
	51	0.3	0.2
	55	4.2	0.2
	59	1.5	0.2
	60	5.2	0.2
	62	10.0	0.2
	63	32.0	0.2
	64	22.0	0.2

* Readings are in equivalent parts per million (ppm) of benzene.



HARGIS + ASSOCIATES, INC.

TABLE F-4
SUMMARY OF HNU READINGS
FROM SOIL SAMPLES

BF-4

DATE	SAMPLE DEPTH (Feet)	SOIL SAMPLE READING (ppm)*	BACKGROUND READING (ppm)*
09-19-86	2	1.0	0.2
	3	2.4	0.2
	4	32.0	0.2
	5	0.4	0.2
	6	8.0	0.2
	7	1.0	
	10	9.5	
	12.5	9.4	0.2
	13.5	10.2	1.0
	14.5	12.0	1.0
	15.5	9.4	1.0
	16.5	9.8	1.0
	17	10.6	
	18	9.4	
	19	9.0	0.2
	20	8.8	0.2
	22	12.2	0.2
	23	7.3	
	24	6.8	0.9
	26	11.2	0.4
	29	12.0	
	30	8.9	
	33	14.1	0.8
	34	17.0	
	35	13.7	0.5
	36	19.8	
	37	9.6	1.0
	38	18.0	1.0
	39	16.2	
	41	19.0	1.5
	42	16.3	
	43	16.0	1.0
	44.5	11.1	0.8
	45.5	22.0	
	46.5	28.0	1.0
	52	2.6	
	53	15.0	
	54	30.0	
	55	10.0	
	56.5	12.6	0.2

* Readings are in equivalent
parts per million (ppm) of benzene.



HARGIS + ASSOCIATES, INC.

TABLE F-5
SUMMARY OF HNU READINGS
FROM SOIL SAMPLES

EB-1

<u>DATE</u>	<u>SAMPLE DEPTH (Feet)</u>	<u>SOIL SAMPLE READING (ppm)*</u>	<u>BACKGROUND READING (ppm)*</u>
10-09-86	128.5	0.2	0.2
	139.0	0.2	0.2
	154.0	0.2	0.2
10-10-86	188.5	0.2	0.2
	191.0	0.2	0.2
10-13-86	224.0	0.2	0.2

* Readings are in equivalent
parts per million (ppm) of benzene.



HARGIS + ASSOCIATES, INC.

TABLE F-6
SUMMARY OF HNU READINGS
FROM SOIL SAMPLES

EB-2

<u>DATE</u>	<u>SAMPLE DEPTH (Feet)</u>	<u>SOIL SAMPLE READING (ppm)*</u>	<u>BACKGROUND READING (ppm)*</u>
10-20-86	4.0	0.2	0.2
	72.0	2.5	0.2
	73.5	4.5	0.2
10-21-86	80.0	48.0	0.2
	82.0	52.0	0.2
	97.0	5.0	0.2
	98.0	10.0	0.2
	105.5	5.0	0.2
	107.0	4.5	
	138.5	0.2	0.2
10-23-86	203.0	100.0	0.2
	203.5	1500.0	0.2
	204.0	450.0	0.2
	204.5	500.0	0.2
	205.0	>2000.0	0.2

* Readings are in equivalent parts per million (ppm) of benzene.



HARGIS + ASSOCIATES, INC.

TABLE F-7
SUMMARY OF HNU READINGS
FROM SOIL SAMPLES

G-3

DATE	SAMPLE	SOIL	BACKGROUND
	DEPTH (Feet)	SAMPLE READING (ppm)*	
11-19-86	136.0	2.0	0.2
12-01-86	137.0	0.2	0.2

* Readings are in equivalent
parts per million (ppm) of benzene.



HARGIS + ASSOCIATES, INC.

TABLE F-9
WEATHER DESCRIPTIONS

<u>DATE</u>	<u>WEATHER CONDITIONS</u>
09-16-86	Sunny, 68°F, slight wind from south
09-17-86	Sunny, 88°F, slight wind from south
09-18-86	Partly cloudy, 69°, light wind from southeast
09-19-86	Cloudy, 72°F, wind from east
10-07-86	Partly cloudy, 73°F, moderate wind from southeast
10-08-86	Overcast, 70°F, light breeze from southeast
10-09-86	Overcast, 68°F, light wind from south
10-10-86	Mostly cloudy, 74°F, moderate wind from west
10-13-86	Clear, 88°F, light wind from west
10-20-86	Clear, moderate to strong wind from west
10-21-86	Partly cloudy, 82°F, light wind from west
10-22-86	Clear, 70°, moderate wind from west
10-23-86	Overcast, 68°F, light to moderate wind from west
11-11-86	Sunny, light wind from east
11-17-86	Overcast, 70°F, light wind from east, occasional showers
11-19-86	Mostly cloudy, light wind from southeast
11-26-86	Clear, no wind
12-01-86	Slightly cloudy, light breeze from north
12-04-86	Cloudy, cool, light wind from south
12-05-86	Cloudy, cool, light wind from southeast
12-08-86	Clear, 68°F, light wind from west



TABLE F-8
SUMMARY OF HNU READINGS
FROM SOIL SAMPLES

LG-1

<u>DATE</u>	<u>SAMPLE DEPTH (Feet)</u>	<u>SOIL SAMPLE READING (ppm)*</u>	<u>BACKGROUND READING (ppm)*</u>
11-11-86	42.0	0.3	0.3
	64.0	>20.0	0.3

* Readings are in equivalent parts per million (ppm) of benzene.



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